

Appendix L

ARCHITECTURE AND CONSTRUCTION YOUTH APPRENTICESHIP

DESIGN/PRE-CONSTRUCTION PATHWAY ARCHITECTURAL PLANNING (UNIT 4)

Unit 4: Design/Pre-Construction Pathway Architectural Planning

Competency

1. Draw a site plan

Performance Standard Condition

Competence will be demonstrated

- at the worksite

Performance Standard Criteria

Performance will be successful when learners:

- ***Compile site measurements and other data***
- Review design data and dimensions of site layout
- Analyze measurement, service, utility, zoning & coding, and ecosystem data with worksite professional
- Select size and scale for plan
- ***Use architectural drafting software*** OR draw manually
- Identify parcel features
 - Indicate existing ground features on drawing (e.g., utilities, contours, landscape features, etc.)
 - Indicate boundaries, easement, buffer areas, and established setbacks of site
 - Draw existing structures
 - Locate and identify bench mark and elevation level
- Indicate modifications of any existing site elements
 - Draw proposed contour lines and indicate any new grade elevations
- Place proposed structure on site with favorable orientation considering site-specific information
 - Draw utility lines and connections
 - Draw additional construction extending beyond exterior walls of structure (e.g., driveways, sidewalks, patios, decks, proposed utilities, etc.)
 - Draw landscaping elements
- Estimate the amount of cut and/or fill necessary to build a structure
- Estimate the increase in storm water runoff from a site
 - Apply Low Impact Development techniques to reduce the impact of development on the storm water runoff quantity and quality
- Indicate scale of drawing and view title
- Indicate north arrow
- Check drawing

Learning Objectives

- Explain the purpose of a site plan
- Describe the process to draw a site plan
- Explain the purpose of contour lines
- Define easement, buffer area and setback as they relate to local codes and construction sites

- Describe how choice of structure placement on site relates to energy, utility, sanitation, and drainage requirements
- Explain how to locate and identify an elevation level
- Discuss issues of storm water run-off and methods to reduce
- Identify site factors which affect the design of a house, including neighborhood property values, review board controls, and access to the site
- Classify roadways according to level of use
- Describe additional features to be considered for commercial properties such as pedestrian access, vehicular access, parking, storm water runoff storage/collectors
- Define cut and fill
- Explain how to calculate cut or fill needed
- Discuss the need to prevent/control wind or water erosion in land development and construction

Comments:

Unit 4: Design/Pre-Construction Pathway Architectural Planning

Competency

2. Draw sectional & elevation views

Performance Standard Condition

Competence will be demonstrated

- at the worksite

Performance Standard Criteria

Performance will be successful when learners:

- Review design data and layouts
- ***Use architectural drafting software*** OR draw manually

EXTERIOR

- Draw grade line
- Project construction lines from plans
- Indicate finished floor level(s)
- Indicate finished ceiling level(s)
- Draw and detail windows and doors
- Draw roof outline
- Letter wall and roof finishes, roof pitch, chimney, decks, and porches
- Add dimensions, scale, notes, labels and view title
- Check drawing

INTERIOR

- Indicate true width of walls
- Indicate all openings in interior or exterior walls
- Indicate typical sections of standard built-in features
- Note wall materials or finish
- Indicate fixtures, built-ins, trim and molding, and utilities
- Add dimensions, scale, notes, labels and view title
- Darken finish lines
- Check drawing

Learning Objectives

- Explain how to draw exterior elevations from one and two point perspectives
- Describe how the grade line is determined
- Distinguish between the characteristics of various exterior styles
- Explain how to draw interior elevations from one and two point perspectives
- List common abbreviations and symbols for interior fixtures, built ins and utilities
- List standard built ins in common residential and commercial structures

Comments:

Unit 4: Design/Pre-Construction Pathway

Architectural Planning

Competency

3. Draw a floor plan

Performance Standard Condition

Competence will be demonstrated

- at the worksite

Performance Standard Criteria

Performance will be successful when learners:

- Review preliminary sketches, notes and specifications
- **Use architectural drafting software** OR draw manually
- Lay out exterior limits of structure
- Block out exterior and interior walls with appropriate thickness
- Indicate openings in exterior and interior walls
- Draw door and window sizes
 - Use a manual to reference basic door types, sizes, ADA requirements, and drawing conventions
 - Use a manual to reference basic window types, sizes, extent openable, and drawing conventions
- Draw other floor plan features
 - Draw cabinetry, appliances, plumbing fixtures, fireplaces and stairs
 - Draft basic electrical symbols, including switches, duplex receptacle outlets, ceiling and wall-mounted lights, and circuit lines
 - Draft second-floor and basement plans
- Use appropriate leads and line weights for both construction and finish lines
- Add dimensions, notes and room labels
- Draw material symbols
- Indicate scale of drawing and view title
- Indicate north arrow
- Check drawing

Learning Objectives

- Describe how detail schedules are written from a floor plan
- Discuss how dimensions of materials/fixtures impact a floor plan and vice versa
- State the ideal orientation, location relative to traffic patterns and plumbing, and egress requirements of bedrooms
- Describe the process of overlay drafting
- Describe the role of layers in CAD floor plan drafting
- Identify the general sizes and drawing conventions of cabinets, fixtures and appliances found in kitchens, bathrooms, and utility rooms
- Identify the finish material symbology use on floor plans
- Differentiate between types of fireplaces
- Delineate miscellaneous floor-plan symbols, including those for hose bibbs, concrete slabs, attic crawl space access, floor drains, and cross-section symbols

- Articulate how CAD floor-plan symbols are stored, placed and moved, and how attributes are used
- Discern when it is appropriate to place electrical symbols on a floor plan and when they should be placed on a separate sheet
- Define basic electrical terms
- Identify basic service specification requirements, including service capacity, service entrance, meter base, and distribution panel locations

Comments:

Unit 4: Design/Pre-Construction Pathway Architectural Planning

Competency

4. Develop a stair section drawing

Performance Standard Condition

Competence will be demonstrated

- at the worksite

Performance Standard Criteria

Performance will be successful when learners:

- Review floor plan and stair specifications
- ***Use architectural drafting software*** OR draw manually
- Confirm floor to floor heights
- Draw finished floor and finished ceiling lines heights
- Calculate and layout risers, treads and landings
- Draw stringer
- Indicate framing around stairs
- Identify materials used to construct stairs
- Draw trim features (e.g., handrail(s), tread covers, etc.)
- Dimension total rise and run
- Indicate headroom clearance and stairwell opening
- Add dimensions, notes and labels
- Check drawing

Learning Objectives

- Explain how to divide any length into an equal number of sections
- Define basic terms and requirements used in stair design and construction
- Explain how to calculate rise and run dimensions for stairs
- Compare construction of open and closed stair designs
- List minimum stair width, tread, riser, landing, and head clearance requirements, as well as known drafting criteria for straight-run, winding, and spiral stairs
- Discuss how to calculate and incorporate headroom clearance and stairwell opening
- Distinguish between requirements for straight, u-shaped, and exterior stairs

Comments:

Unit 4: Design/Pre-Construction Pathway Architectural Planning

Competency

5. Draw a floor system & foundation plan

Performance Standard Condition

Competence will be demonstrated

- at the worksite

Performance Standard Criteria

Performance will be successful when learners:

- Review floor plan, sketches, notes, and specifications
- **Use architectural drafting software** OR draw manually
- Copy common features from floor plan
- Draw the exterior outline of the foundation wall
- Draw the inside wall of the foundation after scaling the wall thickness
- Lay out the footings and structural information
- Draw foundation, structural supports and footing outline
 - Draw floor/joist foundations
 - Draw post-and-beam foundations
 - Draw foundations for columns, chimneys, etc.
- Draw in the floor framing plan showing the layout of girders and joists
- Indicate floor drains, bridges or plates
- Add dimensions, scale, notes, labels and view title
- Indicate symbols and references
- Indicate north arrow
- Check drawing

Learning Objectives

FOUNDATIONS

- Compare the various foundation types and describe their use
- List common materials used for foundations
- Discuss requirements for foundations based on load requirements
- Compare types of foundation construction methods
- Identify how and why slabs may require protection from ground moisture

FLOOR FRAMING

- Distinguish between control, construction, and isolation joints
- Identify basic components, sizes and spacing for joist (stick) and post-and-beam framing
- Compare and contrast the three common framing systems used with wood construction: balloon, platform, and post-and beam
- Discuss how the shape of the ground affects the framing method
- Identify conventional floor framing components and know their typical sizes and spacing
- Explain the function of wood posts and steel columns in floor framing
- Compare and contrast conventional floor joists, open web floor joists, I-joists, and laminate veneer lumber (LVL)
- Define cantilever
- State methods of bracing floor joists

Comments:

Unit 4: Design/Pre-Construction Pathway Architectural Planning

Competency

6. Draw a framing plan

Performance Standard Condition

Competence will be demonstrated

- at the worksite

Performance Standard Criteria

Performance will be successful when learners:

- Review floor plan, foundation plans and construction specifications
- **Use architectural drafting software** OR draw manually
- Draw footing and foundation walls
- Draw supporting girders and joists
- Indicate dimensions of the bearing walls
- Draw in locations of beams and columns with direction of span and size
- Draw waterproofing and ground control for foundation walls, around footings (drain tiles) and under basement floor slabs
- Draw termite protection
- Draw external stud wall construction
- Draw floor and ceiling construction
- Draw wall and ceiling insulation
- Add labels, notes and dimensions
- Indicate material symbols
- Indicate scale of drawing and view title
- Indicate north arrow
- Check drawing

Learning Objectives

FRAMING

- Compare and contrast the three common framing systems used with wood construction: balloon, platform, and post-and beam
- Cite the advantages & disadvantages of steel framing
- Describe the classifications of concrete masonry unit (CMU) construction
- Define basic brick-laying terms and describe insulation and reinforcement options
- Define footing
- Compare types of footings

LOADS

- Distinguish between bearing and non-bearing walls
- Identify categories of loads acting on structures
- Explain how load-bearing factors are considered in structural design
- Describe the physics of structures to bear loads via walls, columns, and beams
- Explain the characteristics of structural beams, cables, trusses, and other structural forms
- Determine loads applied during the design of a structure using load tables and appropriate mathematics

WALLS

- Name the basic components of wall framing, and know their typical sizes and spacing
- Differentiate between double- and single-wall constructions
- Compare external and internal wall construction
- Describe methods for termite control in building design
- Differentiate between three phases of electrical installation: temporary, rough-in, and finish

Comments:

Unit 4: Design/Pre-Construction Pathway Architectural Planning

Competency

7. Draw a roof framing plan

Performance Standard Condition

Competence will be demonstrated

- at the worksite

Performance Standard Criteria

Performance will be successful when learners:

- Review floor plan, foundation plans and construction specifications
- ***Use architectural drafting software*** OR draw manually
- Draw exterior wall outline from floor plan
- Confirm roof style (e.g., gable, shed, hip, etc.) and cornice overhang size
- Draw center ridge board(s)
- Draw all rafters, jack rafters, intersecting pieces, etc., with specified on-center spacing
- Indicate any special construction (e.g., around chimney, etc.)
- Draw gutter and method of roof ventilation
- Add labels, notes and dimensions
- Indicate material symbols
- Indicate scale of drawing and view title
- Indicate north arrow
- Check drawing

Learning Objectives

- Define roof pitch
- Outline common components and their function required in roof framing
- Identify and explain framing terms common to both conventional and trussed roofs
- Define the basic members of conventionally framed roofs, as well as know typical sizes and spacing
- Contrast vaulted roof framing from standard roof/ceiling systems
- Define truss and basic truss terminology
- Identify basic truss types
- Describe how trusses are secured to bearing points
- Explain the role of metal hangers
- Identify the functions of the roof overhang and gutter
- Explain the basic flow of heat, air and moisture through a facility and methods used to control them
- Explain the need for air flow and ventilation in structures

Comments:

Unit 4: Design/Pre-Construction Pathway

Architectural Planning

Competency

8. Develop sustainable/conservation elements into a design

Performance Standard Condition

Competence will be demonstrated

- at the worksite

Performance Standard Criteria

Performance will be successful when learners:

- Review roof framing, floor plan, foundation plans and construction specifications
- Apply the principles of conservation to design plan
- Evaluate construction techniques for energy conservation in framing, caulking, use of vapor retardants, and insulation procedures
- Evaluate the insulation value for walls, floors, vaulted and flat ceilings
- Evaluate the common building products containing formaldehyde-based resins and solvents, as well as appliances for causes indoor pollution
- Calculate the heat loss through one wall of a conditioned building
- Calculate the heat loss for a building envelope with given conditions appropriate for the project

Learning Objectives

- Discuss architectural design and building practices that impact the environment
- Describe the building elements covered by the model energy code
- Explain the Green Building program and Sustainable Building design
- Identify climatic and geographic design criteria, which will have bearing on the design of a structure
- Identify light source types
- Identify daylight design strategies
- Identify energy design strategies
- Explain how window and door details can be designed to provide energy efficiency
- Define R value factors in building
- Explain why caulking is effective, and identify places where caulking is best used
- Explain why vapor barriers help save energy, and name locations where vapor retarders should be installed
- Identify the venting requirements of garages
- Compare types of insulation
- Identify R value information for common types of insulation
- Calculate the recommended roof overhang for different latitudes, as well as specify other methods of achieving alternative overhang protection
- Articulate how the idea of envelope design works, cite its principle components, and discuss the disadvantages of the concept, including safety concerns
- Identify methods of reducing indoor pollution

Comments:

Unit 4: Design/Pre-Construction Pathway

Architectural Planning

Competency

9. Review completed architectural plans and documents

Performance Standard Condition

Competence will be demonstrated

- at the worksite

Performance Standard Criteria

Performance will be successful when learners:

- Compare completed plan with architectural/engineering notes/data, manufacturers' catalogs and construction specifications
- Check drawing for accuracy (e.g., wall placement and size, feature sizes, door/window placement, etc.)
- Check and verify dimensions
- Check and verify notes, lettering, symbols and references
- Check and verify title block information
- Check plan for line quality and type for feasibility, thoroughness, accuracy, code compliance
- Submit completed plans to worksite professional for approvals

Learning Objectives

- Discuss the various systems components of building structures including lighting, heating, ventilation, air conditioning, mechanical, electrical, plumbing, communication and vertical transport on completed plans
- Explain how detailed technical construction documents, schedules, and plans are created from the architectural plan

Comments:

Unit 4: Design/Pre-Construction Pathway Architectural Planning

Competency

10. Revise drawings

Performance Standard Condition

Competence will be demonstrated

- at the worksite

Performance Standard Criteria

Performance will be successful when learners:

- Review drawing revision (change) procedures
- Identify drawing to be modified
- ***Use architectural drafting software*** OR draw manually
- Make modifications to drawing
- Construct a revision table on drawing
- Record changes properly on revision table
- Apply appropriate line thickness and type
- Check drawing

Learning Objectives

- Compare how drawing changes are made and tracked on CAD and/or manual drawings
- Explain how drawing revisions are tracked to other connected technical documents and materials specifications documents
- Discuss the impact on resources of revisions to completed plans

Comments:

Unit 4: Design/Pre-Construction Pathway

Architectural Planning

Competency

11. Construct a Bill of Materials

Performance Standard Condition

Competence will be demonstrated

- at the worksite

Performance Standard Criteria

Performance will be successful when learners:

- Review architectural plan with worksite professional, engineering notes/data, manufacturers' catalogs and construction specifications
- Utilize appropriate reference handbooks
- Convert architectural drawing scale to full dimensions for a construction project
- Calculate the required materials needed
- Select building materials and assemblies upon evaluation that meet project specifications
- Use appropriate combinations of building materials and components that satisfy the requirements of building programs

Learning Objectives

- Explain how to assign numbers to materials required for construction
- Explain how to calculate materials needed from an architectural plan
- Explain criteria used for building materials selection
- Discuss the use of sustainable construction materials and products
- Explain how factors such as force, torque, and shear impact choice of structural materials
- Describe applications and restrictions pertaining to the use of construction materials

Comments:

Unit 4: Design/Pre-Construction Pathway Architectural Planning

Competency

12. Assist to develop architectural detail schedules

Performance Standard Condition

Competence will be demonstrated

- at the worksite
- while assisting a worksite professional

Performance Standard Criteria

Performance will be successful when learners:

- Collect notes and format(s) pertaining to schedules
- **Use architectural drafting software** OR draw manually
- Interior finish schedule
 - Lay out schedule to fit given format
 - Lay out lettering guidelines
 - Make headings for each schedule
 - Define details for interior finish
 - Letter information into finish schedule
 - Check drawing
- Door and window schedules
 - Lay out schedules on floor plan
 - Make headings for window schedule
 - Make headings for door schedule
 - Define details
 - Letter schedules
 - Check drawing
- Door details
 - Review wall section, floor plan, construction specifications and manufacturers' catalogs
 - Draw head, jamb and sill details, including interior and exterior trim finishes
 - Add dimensions, notes and labels
- Window details
 - Review wall section, floor plan, construction specifications, and manufacturers' catalogs
 - Draw head, jamb and sill details, including interior and exterior trim finishes
 - Add dimensions, notes and labels

Learning Objectives

- Articulate the need for schedules, identify information described within it, and how to configure and place schedules on a sheet
- Describe the difference between water supply, distribution, sanitary and storm drainage systems
- Identify structural symbols on technical drawings
- Identify plumbing, piping and drainage symbols on technical drawings
- Identify electrical & wiring symbols on technical drawings

Comments:

Unit 4: Design/Pre-Construction Pathway Architectural Planning

Competency

13. Assist to coordinate architectural project activities

Performance Standard Condition

Competence will be demonstrated

- at the worksite
- while assisting a worksite professional

Performance Standard Criteria

Performance will be successful when learners:

- Review plans and schedules for work to be completed
- Note timeframes, overlaps, and allowances for work completion
- Compile contracts, permits, and licenses as needed
- Coordinate work between trades based on plan
- Schedule contractor work dates
- Plan and route materials shipments
- Follow up to ensure movement of materials and equipment needed to meet established deadlines
- Monitor work completion deadlines
- Track and report any construction issues to worksite professional
- Communicate in a timely and accurate manner to correct parties

Learning Objectives

- Explain how to read architectural schedules and work plans
- List methods of productivity measurement for architectural projects
- Discuss how to schedule contract work and delivery functions with respect to project schedule and requirements
- Compare contracts, licenses and permits uses and the information required on them

Comments: